

# Quinolone Resistance of *E. coli* from Chicken Specimens, 1981-2000

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**Background:** Fluoroquinolones, e.g., enrofloxacin and ciprofloxacin, are important therapeutic agents in animal and human medicine. In 1996, enrofloxacin was approved for control of chicken mortality associated with *Escherichia coli*. Ciprofloxacin (CI) is a broad-spectrum antimicrobial used to treat infections of humans. Nalidixic acid (NA) is a quinolone commonly used for antimicrobial susceptibility testing. This study investigates the resistance to quinolones in *E. coli* isolated from chickens before and after the approval of enrofloxacin in poultry.

**Methods:** *E. coli* were submitted for diagnostic purposes to a veterinary reference laboratory from chickens in California, Arkansas, Alabama, North Carolina and Pennsylvania, from 1981 to 2000 inclusive. One hundred of these *E. coli* were randomly selected for antimicrobial susceptibility testing. Cultures were tested for NA and CI resistance by Etest. NA-resistant cultures were further characterized by sequencing of *gyrA*, *gyrB*, *parC* and *parE* quinolone resistance determining regions (QRDRs). Antimicrobial resistance was defined at  $\geq 32$   $\mu\text{g/ml}$  for NA and  $\geq 4$   $\mu\text{g/ml}$  for CI.

**Results:** From 1981 to 1995, 0% (0/74) of isolates grew confluent with MICs  $\geq 256$   $\mu\text{g/ml}$  NA. Isolated colonies with MICs  $> 256$   $\mu\text{g/ml}$  NA were observed for 3% (2/74) of isolates during this period. All cultures from 1981 to 1995 had MICs  $\leq 0.032$   $\mu\text{g/ml}$  CI. From 1996 to 2000, 23% (6/26) of cultures grew confluent with MICs  $> 256$   $\mu\text{g/ml}$  NA. An additional 8% (2/26) had isolated colonies with MICs  $> 256$   $\mu\text{g/ml}$  NA. The 6 cultures with confluent growth at  $> 256$   $\mu\text{g/ml}$  NA had MICs of 0.125 to 0.75  $\mu\text{g/ml}$  CI. Point mutations were observed in the QRDR of *gyrA*. All other cultures had CI MICs  $\leq 0.032$   $\mu\text{g/ml}$ . Conclusion: Resistance to NA of *E. coli* cultured from chicken clinical specimens after the approval of enrofloxacin for use in poultry was more frequent than those isolated prior to approval ( $P < 0.001$ ). NA-resistant cultures also displayed decreased susceptibility to ciprofloxacin.